The GEEM Program

Graduate Education with an Air Force Focus

An interview with Lt Col Alfred E. Thal, Head, Department of Systems and Engineering Management and Assistant Professor, Engineering and Environmental Management, Graduate School of Engineering and Management, Air Force Institute of Technology.

The CE: For those who may not be familiar with the Graduate Engineering and Environmental Management (GEEM) program, what is its purpose and some of its history?

Col Thal: The program's purpose is quite simple: to help young civil engineer officers transition from technical duties to middle and senior management positions. Our engineers are some of the best in the world and possess great technical skills from their undergraduate degrees. However, engineering and architectural undergraduate programs typically don't include any courses on organizational management skills. This is a weakness we try to address because our engineers are also Air Force officers and we tend to place them in leadership positions very early in their careers. Therefore, the GEEM program is designed to help bridge that gap between technical and managerial, and provide students with skills and knowledge they can use throughout their careers.

Lt Col Alfred E. Thal

As for the program's history, it was initially called Facilities Management and graduated its first class in 1973. It was renamed Graduate Engineering Management (GEM) in 1980 for two reasons. First, there was a change in the curriculum in response to the career field. Second, it was recognized that very few schools around the country offered degrees in facilities management, while engineering management programs were becoming more prevalent. So, part of the reason for the name change was to increase acceptance within the academic community. In 1991, in response to the career field's desire to develop additional expertise in environmental issues, the program was given its current title.

Over the past three decades, the program has graduated 677 students with master of science degrees. Those students have made significant contributions to the career field, and many have gone on to hold some of the most senior leadership positions in the Air Force civil engineer community.

The CE: What other types of changes has the program undergone during this time?

Col Thal: Two important changes were the length of the program and focus of the curriculum. From its inception until the graduating class of September 1995, the length of the program was 15 months. For the class that began in June 1995, the program was extended to 18 months to provide more of the courses the career field desired and to provide a more realistic timeframe for students to perform and complete quality research.

During the early 90s, the curriculum became heavily focused on environmental issues and every faculty member had received their doctoral degree in that field. This was appropriate at the time and was in response to the career field's needs. However, those needs changed again in the mid-90s as an increasing amount of environmental work was performed by our civilian workforce or contracted out. In 1995, Headquarters U.S. Air Force civil engineering leadership decided to more fully include graduate education in its annual review of education and training requirements through the Program Review Committee (PRC). As a result, the Graduate Education Subcommittee was formed in May 1995, with an initial objective being to focus the GEEM curriculum to more closely match the requirements of the career field. You could say that the pendulum has swung back to the center, and there is now a more balanced curriculum.

The CE: How is the career field involved in these curriculum changes?

Col Thal: There are actually two ways — informal and formal. By informal, I'm referring to the networking we, the GEEM faculty, do with the career field. Through friendships and discussions with our peers, we are able to detect trends and identify areas in which the career field is interested. The more formal way is through the Graduate Education Committee (GEC), which makes recommendations to the PRC.

The GEC guides the program's content and emphasis to ensure the curriculum evolves with the changing needs of the career field. The committee, chaired by the Deputy Air Force Civil Engineer and comprised of senior representatives from each major command and field operating agency, reports directly to the PRC and usually meets

annually in March. The PRC, chaired by the Air Force Civil Engineer and comprised of all major command Civil Engineers and agency commanders, meets annually in June to review all CE education and training needs.

Regardless of the manner of involvement, formal or informal, the result may be a change in core courses, a new sequence of courses, development of a new course, or simply incorporating a particular topic in one or more of our existing courses. The bottom line: the GEEM program has always been, and will continue to be, responsive to the career field's needs. Between the reviews accomplished by the GEC and PRC, and internal reviews by GEEM faculty, the GEEM program is ideally suited to provide graduate education tailored to the needs of the CE career field.

The CE: How is the current curriculum structured, and what options are available to students?

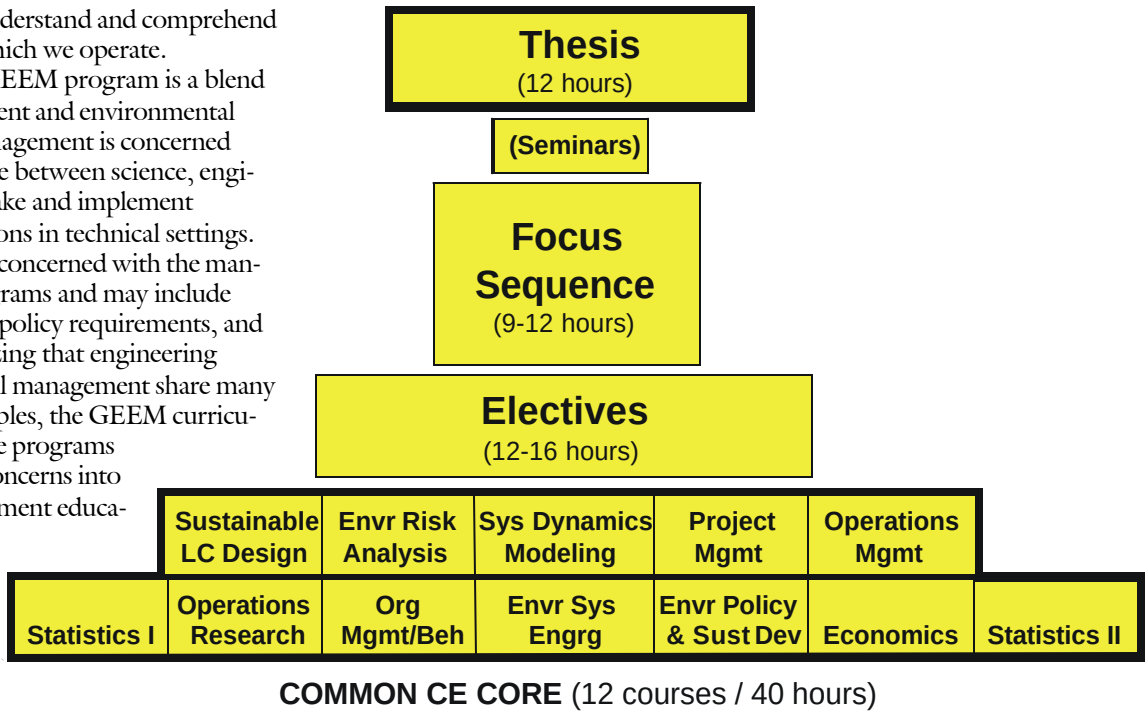
Col Thal: A few years ago, the GEC identified three broad categories in which it recognized that certain abilities and skills desired of CE officers are best achieved through graduate education. First, CE officers should understand the behavior of organizations and be able to help lead organizations to strategic objectives. Second, CE officers should be able to apply basic analytical tools, both quantitative and qualitative, to help improve productivity and optimize resources. This includes all forms of resources — financial, material, information and human. Third, civil engineers should understand and comprehend the regulatory framework in which we operate.

As the name implies, the GEEM program is a blend between engineering management and environmental management. Engineering management is concerned with providing a proper balance between science, engineering and management to make and implement strategic and operational decisions in technical settings. Environmental management is concerned with the management of environmental programs and may include applied science, regulatory and policy requirements, and management skills. By recognizing that engineering management and environmental management share many of the same fundamental principles, the GEEM curriculum goes beyond other graduate programs by integrating environmental concerns into traditional engineering management education. Although the curriculum was heavily slanted toward environmental issues in the early 1990s, the program now strives for a more balanced approach.

There is still a perception that we are heavily focused on environmental topics. I hope your readers will see that this is simply not the case anymore. In fact, this balance is also reflected in our faculty. Our three civilian faculty members offer a tremendous amount of environmental expertise to the program and our three military faculty members bring more of a management focus to the table. This management focus will continue to improve as we ask our pipeline faculty to concentrate their doctoral studies in more traditional engineering management areas.

Students choosing an engineering management sequence will have about 20 percent of their program come from environmental courses. There are currently two specialty sequences in engineering management. The human resource management sequence reinforces the student's knowledge of human resources in organizations and emphasizes the importance of leadership, strategic planning and policy-making. The quantitative decision making sequence allows the student to more fully explore and understand decision support aspects of statistical analysis.

Students choosing an environmental management sequence will have about 70 percent of their program come from environmental courses. There are currently two specialty sequences in environmental management. The applied environmental sciences sequence presents the science and engineering concepts that govern design of treatment and remediation processes for surface water, groundwater and soils. The environmental systems analy-



GEEM Program. The core courses represent what one might expect to find in any traditional engineering management program. Students take all of the core courses and then are free to select a specialty application sequence that provides depth of study in a focused area of engineering management or environmental management and prepares the student for research on a related topic.

sis and management sequence focuses on understanding ecological systems and how these systems are impacted by human activities.

The CE: Is the GEEM program accredited?

Col Thal: I'm glad you asked that. This is another area where there are some misperceptions in the field. There are two types of accreditation for engineering programs. We are accredited by the North Central Association of Colleges and Schools, one of six accrediting bodies in the United States. Without this accreditation, a degree from AFIT would be essentially worthless. However, with it, an AFIT degree has exactly the same academic standing as a degree granted by other accredited schools.

Accreditation from the Accreditation Board of Engineering and Technology (ABET) is an entirely different matter. The purpose of ABET accreditation is to ensure that a graduate who claims to be an engineer has actually received education in the concepts accepted in this country as fundamental to the practice of engineering. Therefore, it is absolutely critical that a bachelor of science (B.S.) degree in an engineering field be ABET-accredited. Very few schools seek the ABET accreditation at the master's level and above; it just isn't common practice. We have chosen not to pursue ABET accreditation for a number of reasons. If we were ABET-accredited, we could only accept students who had an ABET-accredited B.S. degree, which would eliminate some of our CE officers from eligibility. Another reason is that we don't want to lose our flexibility and responsiveness to the career field by subjecting ourselves to the requirements imposed by ABET.

The CE: With what types of research efforts might GEEM students be involved?

Col Thal: The only limitations to the type of research a student might pursue are their own interests and the expertise on the faculty to guide the research effort. The list of topics runs the spectrum — we've had students explore the Aerospace Expeditionary Force, RED HORSE organization, SABER contracts, contingency training, landfill performance, and various types of innovative treatment methods for contaminated sites. It's usually about a fifty-fifty split, with half of the class pursuing a traditional civil engineering topic and the other half pursuing an environmental topic.

The CE: How does AFIT's GEEM program differ from those offered at a civilian institution (CI) and why would you recommend AFIT over a CI?

Col Thal: The primary difference, the one I think the career field is most interested in hearing about, is the Air Force focus we are able to provide. A typical CI does not have a specific customer; therefore, the programs they offer are usually more generic. The CI programs are usually very solid and some are quite good, but they are unable to give the military perspective from which Air Force officers would benefit the most. Here at AFIT though, we only have one customer, and for the GEEM program that customer is the civil engineer career field. Thus, we are able to coordinate with the career field through the GEC and PRC to provide the specific knowledge and tools required to meet the challenges civil engineers face every day on the job.

Another difference is the number of hours the students take in our program. During the six quarters that students are assigned to the GEEM program, they will take at least 72 quarter hours — 60 coursework hours and 12 thesis hours. A student would probably only take about 48 quarter hours in a typical CI program over the same 18-month time span. There are two primary reasons for this difference. First, we fully understand the potential career impact if a student is unable to finish their program. Therefore, AFIT's philosophy is that an 18-month program is needed to ensure students have a high success rate at being able to complete their research efforts and graduate. Second, to ensure the American taxpayers' money is being well spent, we require students to be on full-time status every quarter. Since 12 quarter hours is considered full-time, the total for six quarters is 72 quarter hours.

Other than these two primary differences, academic life at AFIT is essentially the same as at a CI. A student may have two classes that meet for one hour each on Mondays, Wednesdays and Fridays; and two other classes that meet for 90 minutes each on Tuesdays and Thursdays. Time not spent in class is spent studying, doing homework, using the library, writing papers, conducting research, etc. The academic life is the same, regardless of whether it's at AFIT or a CI, the only difference is that students wear the uniform daily at AFIT and report to a military base for their classes.

Why would I recommend AFIT over a CI? The bottom-line answer is the program is ideally suited to provide graduate education tailored to the needs of the CE career field. The breadth of the program provides classes on topics that meet the career field's needs, and the depth of the program allows students to apply their knowledge to a specific research question. The program is highly interdisciplinary and allows students the opportunity to explore specific aspects of research topics by enlisting support from other departments within AFIT. Also, students have an enormous amount of flexibility in choosing their application sequences and research areas; they are able to customize the professional management and technical skills they wish to learn while at AFIT.

The CE: If someone is interested in pursuing the GEEM program, what are the eligibility requirements and the

application process?

Col Thal: Our eligibility requirements are fairly straightforward. Our goal is to have students with a 3.0 GPA [grade point average] in their undergraduate engineering program with a 2.5 math GPA. Additionally, applicants should have taken math courses through differential equations and have at least one course in chemistry. We also require qualifying scores on the Graduate Record Exam of 500 on the verbal portion and 600 on the quantitative portion. If an applicant does not meet these criteria, they may ask for a departmental review of their academic records. We recognize that there's not much a student can do to make dramatic improvements in undergraduate GPAs and will take other factors into account to consider the "whole person" — factors such as subsequent success in graduate-level courses, recognition for academic excellence at squadron officers school, etc. However, we are very strict about students having a course in differential equations — it's considered a prerequisite for two of our core courses and we don't want to have a student enter the program and perform poorly right away. If an applicant does have a weak area, we will work with them to suggest steps to improve their academic record. The bottom line I'd like for your readers to take away from this is: please contact us if you have any questions about academic eligibility.

As for the application process itself, it's actually a two-step process. First, an individual submits a formal "Request for Evaluation" to be declared academically eligible (the form is available on AFIT's web site. The next step is to notify AFPC [Air Force Personnel Center] of their desire to attend AFIT with AF Form 3849. It's important that everyone understand that AFIT determines academic eligibility and AFPC makes the final decision on who is selected to attend. Through the GEC, we are discussing some possible changes to the way the process currently works and will let everyone know how that turns out in the near future.

The CE: When is the right time for an officer to attend, and is there an active duty service commitment associated with the program?

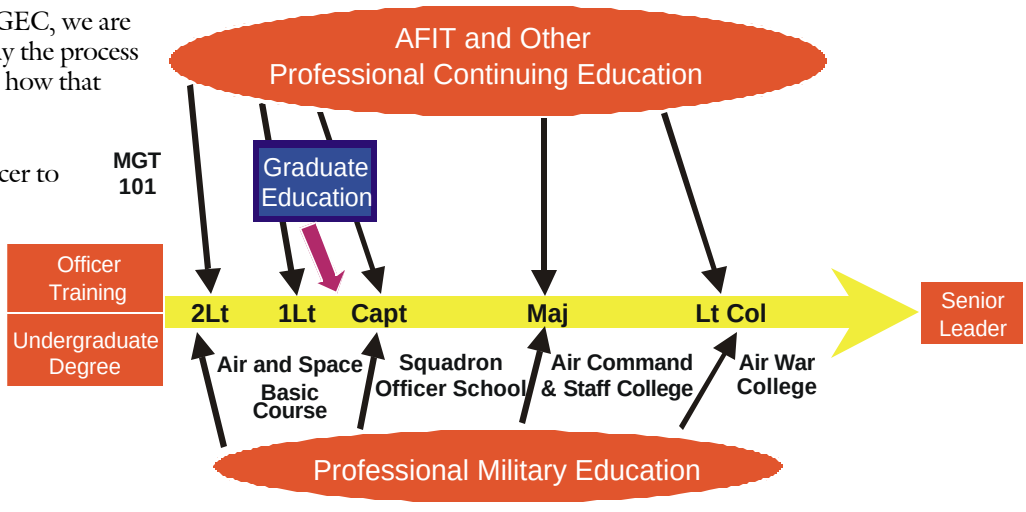
Col Thal: Ideally, we'd like students to have two assignments and five to six years of active duty service under their belts. This allows them to develop a good understanding of the CE business and gives them some experience they can draw from and apply to coursework and research. As I said, this is what we would ideally want. For a variety of reasons though, most of our students are in the three- to four-year group. The key is whether the timing fits well with an officer's career development, and that's another area where AFPC plays a critical role. As for the active duty service commitment (ADSC), there is a 3-year ADSC that begins upon completion of the program and runs concurrently with other service commitments.

The CE: What types of follow-on assignments do students typically receive after graduating from the program?

Col Thal: Most bases have at least one or two positions coded for an advanced academic degree (AAD). Therefore, there are no limitations imposed by the fact that a student has just graduated. As with any assignment, the only limitation is whether there is an opening at the particular base in which the officer is interested. As a matter of information, we usually have one or two people go to a major command, two or three to AFCEE [Air Force Center for Environmental Excellence], five or six volunteer for a remote, four or five might go on an overseas long tour, and the rest go to another stateside assignment. For specifics, I would refer any questions to AFPC.

The CE: If an officer has questions about the program, whom should they contact?

Col Thal: The phone number for the Admissions and Registrar Directorate (AFIT/RR) is DSN 785-6231. Their e-mail is afit.counselors@afit.edu and their web page is http://rr.afit.edu. For the GEEM program, our departmental phone number is DSN 785-2998 and my office number is DSN 785-3636 x4591. My e-mail address is Alfred.Thal@afit.edu and our department's web page is http://en.afit.edu/env.



Civil Engineer Officer Development. According to Colonel Thal, the career field believes graduate education should benefit students for the rest of their careers and not simply their next assignment. To support this broad view, graduate education is considered in concert with both Professional Continuing Education and Professional Military Education, with all three areas critical to the career development of CE officers.

Speaking of AFIT ...

Interviews with current and former GEEM students

Capt Manuel Fernandez

Capt Bill Kale

Capt Laurie Richter

Capt Manuel Fernandez came to AFIT from the 4th CES Environmental Flight, Seymour Johnson AFB, NC.

Q. Why did you come to AFIT and how has it worked out for you?
A. I wanted my next assignment to be school, but I really didn't know what to expect of AFIT. My impression of it was that it wasn't really a well-known or respected program, until I started looking into it more. I'm pretty happy with having come here. I think it's a great decision, and the best part of it is now I know 25 other people in CE who I'll run into again and again.

Q. What would you say to others who are considering AFIT for their graduate education?
A. If they want to get a quality master's degree, I think this is a good program to do it in. A lot of things we do in class pertain to the civil engineer career field, and your only job here is to be a student.

Q. Any other advice you'd give to potential students?
A. One misconception I had when I came here was that if I did the environmental track that meant I was going to an environmental job when I left. That's not always the case. Last year we had people in the management track who went to environmental jobs, while people in the environmental track went to other types of engineering jobs. So, it doesn't necessarily matter what you do here in terms of the job you get afterward.

Capt Bill Kale came to AFIT from Lajes Field, Azores, where he was the base architect with the 65th CES.

Q. Why did you enroll in AFIT's GEEM program?
A. I wanted a degree in engineering management. It didn't really matter from where. In hindsight, I'm glad I came here because you don't have to worry about finding your way on your own as in a civilian institution. Here, they grab hold of you, put you through a refresher course, and you have automatic friends because everyone's in the military. They understand your circumstances and are willing to work with you.

Q. Is there anything else you'd like readers to know about AFIT?
A. It gives you a chance to learn more about the Air Force. If you want to do a thesis on an acquisition topic, an environmental issue, or RED HORSE, you can. Another good thing is three of us were able to take our PE [professional engineer] exam while we were here. Being here gives you the chance to do things like that while you're in study mode.

I think you get out what you put into it. If you come with a lousy attitude and don't put any effort into it, you're not going to get anything out of it. If you put in the effort, you can learn a lot and it should help you reach your goals.

Capt Laurie Richter is a Civil Engineer and Services School instructor and recent GEEM program graduate. Prior to attending AFIT, she was the EOD Flight Chief, 377th CES, Kirtland AFB, NM.

Q. What advice do you have for those considering the GEEM program? Would you recommend it to others?
A. Yes, I would recommend the program to others. I would encourage them to talk to students who are currently going through the program to get an idea of the time constraints and academic load. There is free time to do extracurricular things. At the same time, the studies are hard. The first couple of quarters are the toughest time-wise, because you have a full load. Then, as you go through the program it eases up a little, because you start doing your thesis work and you have fewer courses.

The quarter system is nice because there are built-in breaks for you — one to three weeks during certain parts of the class — so you're able to plan vacations and time with family.

Q. What should they do to prepare?
A. The biggest thing is to talk with students who are going through it to get a feel for the types of subjects we're teaching now, because it may be different from when some of their commanders went through, even a couple years ago. The program is constantly restructured and tailored to meet Air Force civil engineer needs.